

# Plans for the Multiboson Yellow Report

LHC Electroweak Multiboson Meeting, June. 13<sup>th</sup>, 2018

The convening team of EW MB subgroup:

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ATLAS : Kristin Lohwasser (Sheffield), Yusheng Wu (USTC)

# Introduction

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- The idea is to document short theory and experimental overviews, recommendations, and prospect studies in a CERN Yellow Report, concerning the multiboson studies
  - ❖ ***Being encouraged by the refreshed LHC electroweak group***, and suggested to provide an outline by the end of June, and a completed draft by the end of this year.
  - ❖ ***The main objective*** is to try to provide references and recommendations to measurements using LHC full Run-II data and early Run-III data, on topics such as MC event generation, definitions of common fiducial regions and BSM-sensitive variables/regions, EFT and anomalous coupling studies, measurement combinations, and possible other new ideas.
  - ❖ The document will also include short theory and experimental reviews, where the latter will be drafted per analysis channels. These reviews hopefully will provide quick and clear references for analysis teams working with future data.
  - ❖ We have started to invite contributors to work on the respective sections of the YR, especially on MC discussions and on experimental reviews. We welcome all the contributors to participate in our meeting to discuss on their responsible sections as well as to give inputs to the general contents.
  - ❖ If any of you would like to contribute to the YR, please let us know.

# Preliminary Outline

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□ This is VERY preliminary, subject to changes after further discussions

❖ Introduction: general overview of multiboson studies; motivation

❖ Experimental reviews

- 1-2 pages per channel, coordinated between ATLAS and CMS (+ potentially LHCb) contributors, highlighting main features of the channels, past and future precision, limitations, common fiducial definitions / strategy, etc.
- Candidate channels are: WW, WZ, ZZ, W/Z+ $\gamma$ , W/Z VBF, W/Z+ $\gamma$  VBS, WW VBS, WZ VBS, VBS with semileptonic boson decays, Tribosons, and photon-induced diboson.

❖ Theory and MC reviews

- Available generators and fix-order calculations, recommended settings and caveats
- Comparison between generated distributions for various channels using Rivert routines
- More info. in Jonas's [summary](#)

❖ EFT review and recommendation

- Parametrization, Basis
- MC tools
- Observables
- Theory uncertainties
- Possible combination of multiple channels (related to also next chapter)

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## ❖ Combination of measurements

- Examples (e.g. 7 TeV ATLAS+CMS ZZ combination)
- Technicality discussions: presentation of individual measurement results, uncertainty correlations, machinery, etc.
- Prospects for the future
- Other new ideas about combination: e.g. ratio measurements

## ❖ Others (TBD)

- Interpretations based on fiducial measurements
  - Pros & Cons w.r.t. detector-level interpretations
  - Motivated BSM models which can be directly constrained by fiducial measurements, in particular for VBS channels
- Others ...

## ❖ Conclusion

# Further Organization

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## ❑ Contributions to the YR

- ❖ We already contacted several theory colleagues for the contributions to the MC section
- ❖ We started to contact experimental colleagues for the experimental reviews
- ❖ Starting from early this year, we started to organize a series of meetings to discuss the topics for the YR. Further meetings will be organized. Eventually, we will collect the necessary information and draft the other contents based on the outcome of the discussions
- ❖ You are highly welcomed to volunteer yourselves!

## ❑ Next meetings

- ❖ June 21-22, @CERN, LHC EW Group general meeting
  - ❖ Likely, Friday morning will be dedicated to the multiboson group
  - ❖ Where we anticipate a discussion and overview of the YR efforts, please join as well!
  - ❖ <https://indico.cern.ch/event/730246/>

# Technical Details for Editing

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## **General workflow:**

We suggest the collaborative platform Overleaf. It is basically like google-docs but for latex-documents. This platform is very easy to use and is really helpful if you want to write a contribution in several people at the same time.

You can either work online, download the document using git - or even just send us a standalone .tex file + pdf plots (if any) to include.

## **Overleaf instructions (thank to HL-LHC Yellow report conveners):**

- 1) If you are not registered with Overleaf as yet, you can do so. Use your [cern.ch](mailto:cern.ch) mail account, as this will give you, for free, the Professional license. This is needed if you want to access the full functionality, including the ability to grant editing rights to many people.
- 2) You can work directly on the Overleaf version, or you can download the whole package locally from the git repository. You can then use the standard git tools to commit updated versions.

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# Discussions

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